C L A I M S

1. A system for detecting the presence of formation gas in a stream of drilling fluid flowing through a wellbore during drilling of the wellbore, the system comprising at least one sensor chamber connectable to a drill string for drilling the wellbore, each sensor chamber containing a sensor and a volume of a selected gas and having a membrane wall which allows passage of formation gas from the stream of drilling fluid into the sensor chamber, the sensor being arranged to detect a change of a selected characteristic of said volume of gas due to passage of formation gas from the stream of drilling fluid via the membrane wall into the sensor chamber.

2. The system of claim 1, wherein said membrane wall substantially prevents passage of liquid from the stream of drilling fluid into the sensor chamber.

3. The system of claim 1 or 2, wherein the membrane wall is both hydrophobic and oleophobic.

4. The system of claim 3, wherein the membrane wall is formed of a stack comprising a hydrophobic membrane and an oleophobic membrane.

5. The system of any one of the previous claims, wherein the sensor is arranged to detect or measure a change in thermal conductivity of said volume of gas.

6. The system of any one of claims 1to 5, wherein the sensor includes a heat source and a temperature sensor arranged at a selected distance from the heat source, and wherein said volume of gas extends between the heat source and the temperature sensor.

7. The system of any one of claims 1to 6, wherein the sensor is a Micro-Electro-Mechanical-Sensor (MEMS) solid-state sensor.

8. The system of claim 7, wherein the sensor is a conductive MEMS pellistor sensor.

9. The system of any one of claims 1to 6, further comprising a pressure balancing device arranged to maintain the gas pressure in the sensor chamber substantially equal to the fluid pressure in the stream of drilling fluid.

10. The system of claim 9, wherein the pressure balancing device comprises a housing containing a liquid and a gas arranged to exert a force from one to the other, wherein the liquid is in fluid communication with the stream of drilling fluid and the gas is in fluid communication with the sensor chamber.

11. The system of claim 10, wherein the housing comprises a liquid chamber and a gas chamber separated from the liquid chamber by a movable wall, whereby the liquid chamber is in fluid communication with the stream of drilling fluid and the gas chamber is in fluid communication with the sensor chamber.

12. The system of claim 11, wherein said movable wall is a flexible wall.

13. The system of any one of claims 1to 12, further comprising a gas supply device for supplying the sensor chamber with said selected gas.

14. The system of claim 13, wherein the system comprises a first said sensor chamber and a second said sensor chamber, and wherein the gas supply device includes means for supplying a first said selected gas to the first sensor chamber and means for supplying a second said selected gas to the second sensor chamber.

15. The system of claim 13 or 14, wherein the gas supply device is arranged to purge each sensor chamber with the corresponding selected gas.

16. A drill string provided with the system of any one of claims 1to 15.

17. The system substantially as described hereinbefore with reference to the drawings.

18. The drill string substantially as described hereinbefore with reference to the drawings.